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MADROÑO

A WEST AMERICAN JOURNAL OF BOTANY

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THE GENUS HELIANTHEMUM IN CALIFORNIA[1]

BERYL O. SCHREIBER

Helianthemum suffrutescens sp. nov. Frutex, 4–8 dm. altus erectus robustus foliosus, e basi virgate ramosus; cortex porphyreus; ramuli lignosi vel herbacei, ad basin tomentosi; folia 10–43 mm. longa, 2–8 mm. lata, lineari-lanceolata vel oblanceolata, planata, margine paullo revoluto, apice acuto obtusove; petioli breves vel obsolescentes; panicula bracteata; bracteae 2–25 mm. longae, inferioribus foliis simillimis; alabastri ovati acuminati; sepala pilis stellatis apicibus plerumque rubris dense sparseve pubescentia, exterioribus 2 mm. longis, 0.25 mm. latis, anguste linearibus, interioribus 4–5 mm. longis, 2–2.5 mm. latis, ovatis acutis; petala 6 mm. longa, 5–6 mm. lata, obovata, apice erosa; stamina 19–30; ovarium 3-loculatum; stylus 0.5 mm. longus, crassus; stigma capitatum trilobatum capsula loculicida, apice acuto; semina immatura trigona, manifeste scrobiculata granulatave; funiculus longus curvatus.

Erect shrub 4–8 dm. high, robust, leafy, virgately branching from the base, distinctly woody, twigs woody or herbaceous with stellate tomentum which persists to the woody base; leaves linear lanceolate to oblanceolate, flat, slightly revolute on the margin, 10–43 mm. long, 2–8 mm. wide, acute or rounded at the apex, shortly petioled or almost sessile, densely stellate pubescent; flowers in leafy bracteate panicles, bracts 3–25 mm. long, the lower conspicuously foliaceous; buds ovate, acuminate; sepals densely to lightly stellate pubescent, hairs often tipped red, outer 2 mm. long, .25 mm. wide, narrowly linear, inner 4–5 mm. long, 2–2.5 mm. wide, ovate-acute; petals 6 mm. long, 5–6 mm. wide, obovate, erose at apex; stamens 19–30; ovary 3-celled; style short, 5 mm. long, stout; stigma capitate, 3-lobed; loculicidal capsule acute at apex; immature seeds 3-sided, appearing pitted or granular, attached to placenta by a long curving funiculus.

Type. AMADOR COUNTY: dry slope, 5.5 miles west-southwest of Bisbee Peak, elevation 500 feet, May 23, 1936, *Beryl Schreiber 2243*.

Other specimens examined. AMADOR COUNTY: Bisbee Peak, April 29, 1936, *G. T. Nordstrom 254;* Michigan Bar, Apr. 24, 1936, *G. T. Nordstrom 760;* Michigan Bar, May 23, 1936, *Beryl Schreiber 2244;* Michigan Bar, June 12, 1937, *Beryl Schreiber 2401.*

The type specimen and the additional collections are filed in the Vegetation Type Map Herbarium, California Forest and

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[1] Contribution No. 2 from the Vegetation Type Map Herbarium of the Forest Survey Division of the California Forest and Range Experiment Station. The author is supervising botanist, Project No. 365-03-3-35, conducted under the auspices of the Works Progress Administration.

MADROÑO, Vol. 5, pp. 81–104. July 6, 1939.

Range Experiment Station, located in the University of California Herbarium at Berkeley. Isotypes have been distributed to the United States Forest Service Herbarium and United States National Herbarium at Washington, D. C.; Gray Herbarium at Harvard; and the University of California Herbarium.

Helianthemum suffrutescens was abundant at the type locality, associated with *Adenostoma fasciculatum, Arctostaphylos manzanita, Quercus Douglasii, Lotus scoparius, Gnaphalium decurrens* var. *californicum* and species of grass. The area had been burned recently as indicated by the blackened stumps of *Adenostoma fasciculatum* and the heavy growth of *Gnaphalium decurrens* var. *californicum* and *Lotus scoparius.* In the Michigan Bar area the plants of *Helianthemum* appeared even more robustly suffrutescent than at the type locality. They occurred in scattered clumps associated with *Quercus Wislizenii* and grasses.

Helianthemum suffrutescens may be distinguished readily by its virgate habit, woody stems and abundant very gray foliage from the green rush-like *H. scoparium* Nutt. var. *vulgare* Jepson of the Sierra foothills, Coast Ranges and southern California. The leaves of *H. scoparium* var. *vulgare* are usually linear or occasionally wider, revolute and green, slightly pubescent to glabrate, and usually deciduous in early summer, a peculiarity which gives the plant a slender broom-like appearance.

The seeds of *Helianthemum suffrutescens* are apparently fire resistant. Many of the species of other genera in the type locality had been completely killed by fire, whereas *H. suffrutescens* had reseeded itself and mature shrubs were common. In the Michigan Bar area the year following a fire, the seedlings were innumerable and were the dominant plants in the locality. In the same area the year previous the individuals could have been counted. Therefore it is suggested that fire encourages the spread of this species which becomes a dominant part of a fire type vegetation in both the Bisbee Peak and Michigan Bar localities.

Helianthemum suffrutescens is densely leafy throughout its life cycle and observations made at different seasons over a period of two years failed to reveal the plants in a leafless condition. Collections of the seedlings were made in the Michigan Bar locality. These young plants had the same virgate habit as the mature shrub, and were extremely leafy, many of the leaves being oblanceolate and very pubescent but somewhat greener than in the older plants. The seedlings of *H. scoparium* var. *vulgare* are very narrow leaved and much greener in appearance.

The flower panicles in the *Helianthemum suffrutescens* are always leafy bracted while, according to most authors, those of *H. scoparium* var. *vulgare* are not. However, close scrutiny of many plants of this variety reveals the fact that the character of the naked as opposed to the leafy inflorescence does not hold,

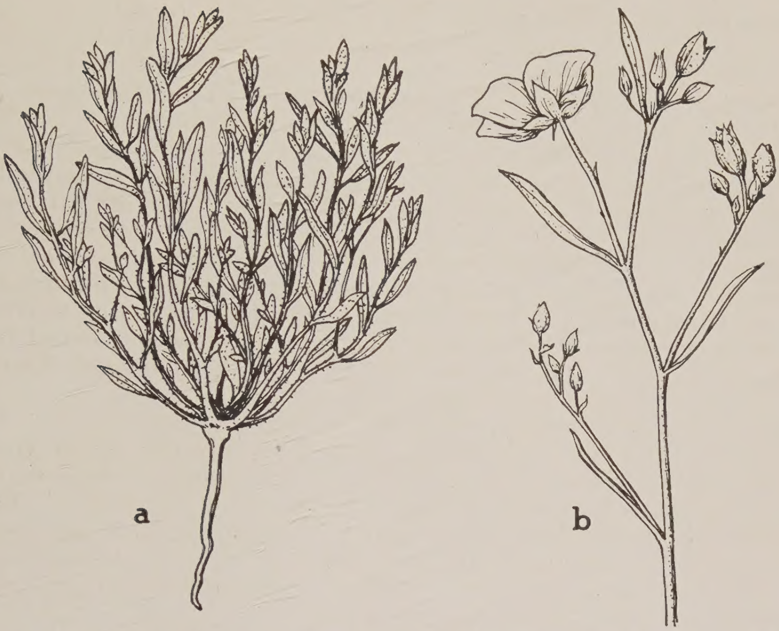

FIG. 1. *Helianthemum suffrutescens* Schreiber: *a,* seedling, × ½; *b,* inflorescence, × ½.

although the inflorescence is never so leafy as that of *H. scoparium.* Careful examination discloses no important differences in the flowers or the immature seeds of the two Sierran plants.

Typical *Helianthemum scoparium* is apparently restricted to the immediate coastline of California, occasionally extending inland where coastal influences are prevalent. *Helianthemum suffrutescens* is, therefore, geographically separated from this coastal plant. The coastal species is low, usually more or less divaricate in habit, the ultimate twigs erect, specimens from the type locality at Pacific Grove, Monterey County, appearing more or less twisted or matted. It is definitely green in appearance and slightly pubescent to glabrate, its leaves narrowly linear and often so revolute as to appear terete; almost wholly deciduous in the fall. The flower buds are relatively large and subtended by foliaceous bracts which often exceed the buds. The flowers are fewer than in *H. scoparium* var. *vulgare* or in *H. suffrutescens.*

Helianthemum scoparium var. *Aldersonii* Munz also is geographically separated from *H. suffrutescens.* It is found in the interior southern California mountains from the San Bernardino Mountains south to San Diego County. The characters which separate this variety from *H. scoparium* and *H. scoparium* var. *vulgare* as well as from *H. suffrutescens* are the extremely large and open panicle and larger sepals and petals. However, some of the material of *H. scoparium* var. *vulgare* observed in Amador County has quite open panicles and rather large sepals, although the petal measurements were smaller. It would seem that there might be a relationship between the Sierran plant and the southern Californian plant. However, further field study on the southern California entity is necessary.

The third Californian species, *Helianthemum Greenei* Rob., is insular in distribution and differs widely from all the mainland species. The flowers are corymbose instead of paniculate and the calyx is densely glandular-pubescent. The foliage, however, closely approaches that of *H. suffrutescens* in aspect, although it is somewhat more grayish-pubescent.

The following key summarizes the differences between the California species and varieties of *Helianthemum*.

- Flowers paniculate; calyx non-glandular.
  - Leaves narrowly linear; green, sparsely stellate pubescent to glabrous, deciduous in summer.
    - Low and divaricate; matted, with ultimate twigs erect, flowers few; inflorescence usually very leafy . . . . *H. scoparium*
    - Tall and rush-like; flowers numerous; inflorescence sparsely leafy.
      - Panicle usually narrow; petals approximately 4–6 mm. long . . . . *H. scoparium* var. *vulgare*
      - Panicle extremely open, petals 8–12 mm. long . . . *H. scoparium* var. *Aldersonii*
  - Leaves linear-lanceolate to frequently oblanceolate, densely stellate pubescent; not deciduous in summer . . . . *H. suffrutescens*
- Flowers corymbose; calyx glandular; Santa Cruz Island . . . *H. Greenei*

Many authors place the new world species of *Helianthemum* in the genus *Crocanthemum*. It seems, however, that the characters used as a basis for this separation are inadequate. *Crocanthemum* was first proposed by Spach (3) in 1836. At a later date he (4) distinguished it from *Helianthemum* by its alternate leaves, lack of stipules, straight peduncles, linear cotyledons and new world distribution. Spach mentions that *Crocanthemum* often has the lower leaves opposite and occasionally plants of *Helianthemum* have ascending peduncles both of which are exceptions to the characteristics of these genera as differentiated by him.

Janchen (1) separates the two genera on the basis of the old world species having opposite, 3-nerved leaves, and the cotyledons being linear-filiform and sessile, while the new world species have alternate, pinnately nerved leaves, and cotyledons united at the base. However, as has been pointed out by Spach (4), the lower leaves of *Crocanthemum* are sometimes opposite and the leaves in *Helianthemum* are pinnately nerved and not 3-nerved.

As to the cotyledons Spach (4) describes those of *Helianthemum* as being elliptic or elliptic-orbicular, whereas, in *Crocanthe-*

mum they are linear. In Janchen's paper (1) the cotyledons were described as linear in *Helianthemum,* and, later, in an emended description of the genus in Engler's Pflanzenfamilien (2) he states that the cotyledons are long-elliptic. Apparently from these descriptions the difference in shape of the cotyledons would seem to be well marked. However, cotyledons of many seedlings of *Helianthemum suffrutescens* were examined in the field and it was found that they varied in shape from linear to elliptic or occasionally wider. Some of the cotyledons were united at the base and others were not. These facts indicate that in this group the shape and character of the cotyledons are not satisfactory criteria for separating genera.

The absence of stipules was formerly considered both by Spach (4) and Janchen (1) as important in the generic segregation of *Crocanthemum.* Later, a species from the Gulf States, *C. stipulatum,* was described by Janchen and this character lost its significance in the separation of old and new world groups.

Further study may reveal well defined differences between *Helianthemum* and *Crocanthemum* but for the present the new world species are referred to the genus *Helianthemum.*

November 22, 1938.

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A NEW SPECIES OF CIRSIUM FROM CALIFORNIA

HELEN K. SHARSMITH

Cirsium campylon sp. nov.

Herba perennis, erecta, crassa, pallido-viridis, hydrophila, 6–21 dm. alta; e caudice caules vulgo solitarii, lanati vel arachnoidei, indumento tarde deciduo, sparse glanduloso-papillati; folia lanceolata, subtus albo-lanata supra glabrescentia; laminae pinnatifidae, sinibus rotundis, segmentis irregulariter 3–4-lobatis, lobis saepe quam longis latioribus, in aculeis crassis, stramineis 5–15 mm. longis terminatis; folia basalia 60–70 cm. longa; folia caulina superiora 20–40 cm. longa; capitula cernua, 2.5–3 cm. alta; involucri bracteae anguste ovatae, valde recurvatae, coriaceae, 20–30 cm. longae, subter medium latissimae, ad mediis marginibus undulatae erosulatae, attenuatae, sulcatae, aculeo crasso 3–5 mm. longo terminatae; corolla alba, 18–22 mm. longa; microsporae 31–33 μ diametro; styli rami 4–6 mm. longi.

Erect, coarse, pale green, hydrophilous perennial, 6–21 dm.

in height, 3–9 dm. in spread; caudex woody, thick, bearing fascicled roots; cotyledons subpetiolate, oval, 10–12 mm. long, 5–7 mm. wide, glabrous; stems mostly solitary, 2–5 cm. in diameter at base, grooved longitudinally, lanate, arachnoid with age, slightly glandular-papillate, fistulous, leafy throughout, bearing floriferous branches at the nodes; leaves lanceolate, lanate beneath, arachnoid with age, the veins not or only weakly glandular-papillate, upper surface less densely arachnoid and more glandular-papillate, subglabrate with age; stomata 29–35 microns; blades shallowly to deeply pinnatifid into irregularly 3 or 4-lobed segments with rounded sinuses, the posterior portion of each segment directed upward 90 degrees from the midrib, the lobes of the segments often broader than long, ovate, their midribs terminated by stout, often brownish-based, stramineous prickles 5–15 mm. long, lateral prickles small; basal leaves 60–70 cm. long, the lower third of blade with small lyrate pinnae; cauline leaves gradually reduced above, the uppermost 20–40 cm. long, all sessile and decurrent with prickly, auriculate bases; inflorescence bracteate, paniculate, the heads numerous; larger bracts of the inflorescence 8–10 cm. long, reduced upwards, lower portion with stout marginal prickles up to 25 mm. long, nearly entire above the middle; heads strongly nodding, 2.5–3 cm. long, 4–4.5 cm. broad; involucral bracts in 6 to 8 (or 10) series; outer bracts strongly recurved, narrowly ovate, channelled, coriaceous, 20–30 mm. long, 6–8 mm. wide, margins near middle undulate and ciliate or erose, basal half of bracts greenish, smooth, glabrous, upper half tapering, light green to somewhat reddish, dull, sparingly glandular pubescent to glabrate, tipped with a stout prickle 3–5 mm. long; inner bracts progressively smaller and more erect, plane, horny, pale green, shining, the apical portion spatulate dilated, recurved, undulate margined, subcoriaceous, subglabrate, acute and weakly prickle tipped; corolla white, 18–22 mm. long, the tube 6–8 mm. long, the throat cylindric, 6.5–7 mm. long, the lobes subequal, 3.5–4 mm. long, somewhat spreading, the margins slightly inrolled, the apex acute and hooded; filaments 3–8 mm. long, glandular pubescent; anthers pink, 6–8 mm. long; pollen grains regular, 31–33 microns in diameter; style white, 21–30 mm. long, the branches linear, obtuse, erect, appressed, 4–6 mm. long; achenes 4 mm. long, 2 mm. wide, angled at truncate apex, dark brown, shining; pappus bristles 30 to 40, tawny, 8 to 14 of the bristles clavellate tipped, 12–13 mm. long, 2–4 mm. longer than the others.

Type. In a dense colony along margins of El Puerto Creek near its junction with Adobe Creek, Arroyo del Puerto, Red Mountains, Mount Hamilton Range of the South Coast Ranges, Stanislaus County, California, altitude 1700 feet (515 meters), May 24, 1936, *H. K. Sharsmith 3761* (Herb. Univ. Calif., no. 610761, inflorescence, no. 610762, leaf); isotypes at Gray Her-

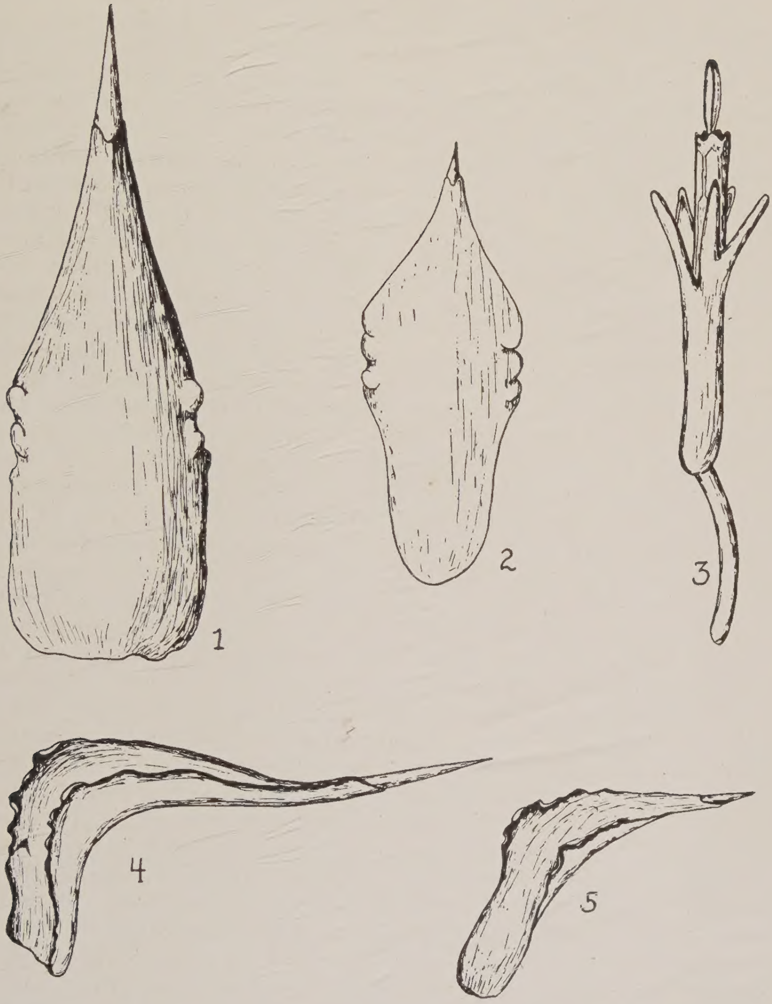

Fig. 1. Comparative drawings of *Cirsium campylon* and *C. fontinale: 1,* involucral bract of *Cirsium campylon,* outer surface, ×3; *2,* involucral bract of *C. fontinale,* outer surface, ×3; *3,* floret of *C. campylon,* ×3; *4,* involucral bract of *C. campylon,* side view, ×3; *5,* involucral bract of *C. fontinale,* side view, ×3.

barium and Royal Botanic Gardens, Kew.

Range. Mount Hamilton Range of the South Coast Ranges of California, altitude 1000–2500 feet (300–750 meters). Forming dense but isolated colonies in moist, sandy soil along edges of small, perennial streams, all known localities occurring in areas of serpentine rock. Flowering April to September.

The writer is grateful to the curators of the following herbaria for the loan of specimens: University of California (UC); California Academy of Sciences (CA); Vegetation Type Map Herbarium of the California Forest and Range Experiment Station, Berkeley (VTM).

Specimens examined. Stanislaus County: Arroyo del Puerto, *H. K. Sharsmith 3941* (topotype, UC); tributary to Adobe Creek, *H. K. Sharsmith 3602* (UC), *Carter & Morrison 3099* (UC). Santa Clara County: Colorado Creek, *H. K. Sharsmith 3891, 3940* (UC), Metcalfe road northeast of Coyote, *H. K. Sharsmith 3953, 3954* (UC), *C. M. Belshaw 2279* (VTM); Coyote Creek, *Eastwood & Howell 4517* (CA, UC).

The naming of an additional species in a large, polymorphic and cosmopolitan genus demands particular caution. The difficulties, however, are somewhat mitigated in this instance, since *Cirsium campylon* falls into an isolated section of the genus, *Dermatolepis* Petrak (Die nordamerikanischen Arten der Gattung *Cirsium.* Bot. Centralblatt Beiheft 35: 223–567. 1917). This section was erected for a single species, *Cirsium fontinale* (Greene) Jepson (Fl. W. Middle Calif. 505. 1901), known only from the Crystal Springs area of San Mateo County in the outer South Coast Ranges of California. Petrak characterizes *C. fontinale* as a relict occupying a highly isolated position not only among American species of *Cirsium,* but within the genus as a whole. *Cirsium fontinale* var. *obispoensis* J. T. Howell (Lflts. West Bot. 2: 71. 1938), has been described recently from specimens collected in San Luis Obispo County (Chorro Creek, *Eastwood & Howell 2218,* CA, type, UC, isotype; Prefumo Canyon, *Eastwood & Howell 5917,* CA, UC) and is thus widely separated from the Crystal Springs area occupied by the originally described phase of *C. fontinale.*

The distinguishing features of the section *Dermatolepis,* as given by Petrak, are an arachnoid and glandular-papillate indumentum, a somewhat unequally five-lobed corolla, and involucral bracts which are ample, coriaceous, reddish, recurved, broadened above the middle, abruptly acute, and tipped with a stout but short prickle, the inner bracts progressively narrower, spatulate-dilated, scarious, and erect. Petrak considers the involucral bracts of *C. fontinale* to be highly distinctive, and more nearly comparable to those of *Carduus platylepis* Sauter of the old world than to those of any North American species of *Cirsium. Cirsium fontinale* var. *obispoense* fits into Petrak's general description of the section *Dermatolepis,* and it requires only minor amplification of the sectional characters to include *C. campylon.*

The double indumentum and unequally five-lobed corolla are common to both *Cirsium campylon* and *C. fontinale* and there is likewise a similarity in general habit. The involucral bracts, which are the most commonly used basis for specific differentiation within the genus, are fundamentally similar in the two species, but there are certain technical differences. The name *C. campylon,* suggested by Dr. W. A. Setchell, is descriptive of the bracts in this species, which are "curved like a bow." The following key indicates the salient differences between the two species, and amplifies the section *Dermatolepis* to include *C. campylon.*

Stems mostly single from caudex, green; heads strongly and permanently nodding; outer involucral bracts green, strongly recurved, channelled, coriaceous, 20–30 mm. long, widest below middle, upper half tapering, tipped with a 3–5 mm. prickle; style branches 4–6 mm. long . . . . *C. campylon*

Stems mostly 3–5 from caudex, reddish; heads somewhat nodding, usually erect at maturity; outer involucral bracts reddish, moderately recurved, plane to somewhat channelled, subcoriaceous, 15–20 mm. long, widest above middle, abruptly acute, tipped with a 1–2 mm. prickle; style branches 3–4 mm. long . . . . *C. fontinale*

Minor differences occur between *Cirsium campylon* and *C. fontinale* in size, pubescence, leaves, and flowers. In a number of these characters *C. fontinale* var. *obispoense* approaches *C. campylon* rather than typical *C. fontinale,* although in involucral bracts the variety *obispoense* is definitely aligned with *C. fontinale. Cirsium campylon* reaches and sometimes exceeds six feet in height, typical *C. fontinale* averages and seldom exceeds four feet, and *C. fontinale* var. *obispoense* may reach six feet. Most herbarium material of the typical phase of *C. fontinale* gives an erroneous impression of small size, for the sheets consist almost entirely of depauperate plants. Greene's original description of *C. fontinale* (*Cnicus fontinalis* Greene, Bull. Calif. Acad. Sci. 2: 151. 1887) mentions the height as two feet, and Petrak describes the plants he cites as one to two feet tall. In regard to the double indumentum, the woolly component predominates in *C. campylon,* and the glandular-papillate component in the typical phase of *C. fontinale,* although *C. fontinale* var. *obispoense* may be as lanate as *C. campylon.* Minor differences in shape and size of the leaves occur in the two species. The lobes of the segments are ovate and the sinuses rounded in *C. campylon,* whereas the lobes are triangular and the sinuses angled in typical *C. fontinale;* also *C. campylon* has larger basal leaves. *Cirsium fontinale* var. *obispoense* again approaches *C. campylon* rather than typical *C. fontinale* in these features. The prickles on the bracts of the inflorescence are considerably larger in *C. campylon* than in either typical *C. fontinale* or *C. fontinale* var. *obispoense.* There are several minor differences in flower structure, particularly as to style branches, which are usually partially included in *C. campylon,* and exserted in typical *C. fontinale* and *C. fontinale* var. *obispoense.*

The heads of *Cirsium campylon* are conspicuously drooping on limp peduncles while those of *C. fontinale* nod only slightly and are usually erect at maturity. The extent of this nutant condition of the heads can be determined satisfactorily only in the field.

Cirsium campylon and *C. fontinale,* as known, are entirely restricted to areas of serpentine rock, and grow only in the boggy soil of springs or along the margins of perennial streams. Geographically, there is the width of the Santa Clara Valley and the eastern slope of the outer South Coast Ranges between the most proximate colonies of *C. campylon* and the typical phase of *C. fontinale.* Thus *C. campylon* is subjected to a more arid, interior climate, with lower average precipitation and less fog, than is typical *C. fontinale.* About two hundred miles south are the two known localities of *C. fontinale* var. *obispoense,* with climatic conditions approximating those of the species proper. Such facts, together with morphological features, suggest that these two highly localized, endemic species arose from a common stock early in the history of the genus in western America, and that climatic and edaphic factors played a considerable part in their segregation and ultimate extreme localization.

State College of Washington, Pullman,
February 10, 1938.

A REALIGNMENT OF THE PANICUM THERMALE GROUP

Hazel M. Schmoll

While attempting to put in order material of the genus *Panicum* in the Herbarium of the Field Museum, considerable morphological variation and distributional discontinuity were noted in specimens referred to *Panicum thermale* Bolander. Reference to the original description of this species and to treatments in various manuals did not clarify the situation. A further study of the group was then suggested by Dr. Julian A. Steyermark of the Field Museum to whom the author is much indebted for criticisms and suggestions. Material was borrowed from the following herbaria: Gray (G), University of California (UC), United States National (US), Field Museum (F) and Rocky Mountain (RM). The writer is grateful to the curators of these herbaria, and especially to Dr. Paul C. Standley of the Field Museum.

As a result of this study it was found that *Panicum thermale* Bolander as currently interpreted is really a complex group conconsisting of three species and two varieties. Typical *P. thermale* apparently occurs only in the hot springs region of Sonoma and Napa counties, California, while the other species occur near Mount Lassen, California, and in the Rocky Mountains.

The outstanding character which separates the Pacific Coast species of this group from those of the Rocky Mountains is the structure of the panicles. Those of the Pacific Coast species are usually narrower than long, with upright branches, the lower of which are strongly fascicled, whereas the panicles of the Rocky Mountain species are as broad as or broader than long with lower branches spreading and not strongly fascicled.

Panicum pacificum Hitchcock & Chase is excluded from the *Panicum thermale* aggregate since it lacks the densely velvety pubescent leaves characteristic of that group. It is allied to *P. thermale* and is also especially close to the eastern species, *P. lanuginosum.*

Specimens of *Panicum thermale* from The Geysers, Sonoma County, California, the type locality, differ markedly from other western species of section *Lanuginosa.* They are taller and the densely velvety pubescent leaves are more upright and much longer and narrower. The species is apparently restricted to the vicinity of the type locality and adjacent Napa County. An emended description follows.

PANICUM THERMALE Bolander sp. emend. *P. thermale* Bolander, Proc. Calif. Acad. Sci. 2: 181. 1862.

Plants grayish or light green, densely tufted, 12–42 cm. high; culms erect, slightly geniculate at base, internodes often curved, branches often arising from all but uppermost node along the culm, glabrous or villous, nodes with a dense ring of hairs, glabrous ring usually below node; ligule 3 mm. long; sheaths of main culm rarely overlapping, uppermost sheath elongated, glabrous or villous, densely villous-ciliate on margin, with dense ring of short hairs at collar, papillose; blades of the rosette mostly narrow to linear-lanceolate, 2.1–10 cm. long, 4–6 mm. wide; blades of main culm thick, ascending, and usually almost appressed to the stem, slightly subcordate, taper-pointed, linear-lanceolate, 6–12.5 cm. long, 4–8 mm. wide, uppermost blade reduced, both surfaces densely velvety pubescent, often velvety-villous on the upper surface, especially on the lower half; edge of blade cartilaginous, scabrous; panicles included in sheath or rarely short-exserted, 4–9 cm. long, 1.2–2.7 cm. wide, densely branching, all branches upright, branches on lower part of axis fascicled, densely flowered, lower part of axis and branches pubescent; spikelets obovate-elliptic, obtuse, papillose-pilose, 1.7–2 mm. long, 0.5–1 mm. wide; first glume truncate to acuminate, one-third to one-fourth the length of the spikelet; fruit 1.3–1.6 mm. long, 0.6–0.7 mm. wide.

The autumnal form has reduced leaves occurring in fascicles at the ends of slender branches along the main stem; blades 1–2 cm. long, 1.5–2.5 mm. wide, narrowly lanceolate, acuminate, involute, velvety pubescent on both surfaces, velvety-villous on lower part of upper surface.

CALIFORNIA. Sonoma County: Geysers, 1866, *H. N. Bolander 3941* (type, G); 1860–67, *Bolander 3941* (US, UC); warm loose soil, Geysers, *Bolander 8* (G autumnal form, US); Geysers, 1860–67, *Bolander* (F); Geysers, *Bolander* (F); 1860–67, *Bolander*

(US); ex Herb. Bebb, *Schott* (F); Geysers, June 26, 1877, *Volney Rattan* (UC); Geysers, July 5, 1931, *Marcus E. Jones 29210* (UC). Napa County: near McDonald's, November 10, 1861, *W. H. Brewer 861* (US autumnal form).

Panicum ferventicola sp. nov. Plantae pallide virides atque saepius plus minusve purpurascentes, caespitosae, tactu velutinae, in sicco brunnescentes; culmi erecti, pilis adpressis vel patentibus basi saepe bulbosis villosi; vaginae infimae paulo imbricatae, superiores internodiis breviores, pilis adpressis vel patentibus basi interdum bulbosis villosae; laminae culmi lanceolatae e basi cordata versus apicem acutum vel acuminatum angustatae, saepe apice in sicco paullo involutae, 3–5.5 cm. longae 5–9 mm. latae, subtus dense velutinae, supra apice glabrae vel glabratae, infra apicem pilis basin laminae versus sensim longioribus velutino-villosae, margine cartilagineo scabro; paniculae culmorum primariorum longiexsertae, culmorum breviorum subinclusae vel breviter exsertae, 3–6 cm. longae 3–5.5 cm. latae, ca. aequaliter longae et latae, densiflorae, ramis infimis panicularum exsertarum vulgo patentibus dense villosis; spiculae vulgo purpureae papilloso-pilosae obtusae obovoideae 1.4–1.7 mm. longae.

Plants light green with varying amounts of purple, tufted, forming dense prostrate mats, velvety to the touch, drying brown; culms stiffly erect, 6.5–31.5 cm. long, lower nodes sometimes geniculate, villous; hairs of ligule 3–3.5 mm. long; sheaths velvety-villous with appressed to spreading hairs sometimes papillose at base; blades of culm lanceolate tapering gradually from a cordate base, acute or acuminate, often becoming slightly involute at tip when dry, 3–5.5 cm. long, 5–9 mm. wide, lower surface densely velvety, upper surface glabrous to glabrate at tip with short hairs to densely velvety with increasingly longer hairs toward base; panicles about as broad as long, 3–6 cm. long, 3–5.5 cm. wide, lower part of axis and branches densely villous; spikelets obtuse, obovate, 1.4–1.7 mm. long, 0.7–1 mm. wide; first glume one-fourth to one-fifth the length of the spikelet; fruit 1.2–1.5 mm. long, 0.6–0.9 mm. wide, elliptic, slightly pointed at tip.

Autumnal forms have numerous shoots arising at the base forming a dense mat; blades not reduced.

WYOMING. Yellowstone National Park: growing in fine gravel in warm soil close to a boiling spring, the plants bathed in hot vapor, forming dense prostrate mats, five miles north of Norris Geyser Basin, August 10, 1908, *Agnes Chase,* American Grasses no. 137, US (type, G; isotypes, UC 184265, F 414079); the Thumb, Yellowstone Lake, September 17, 1902, *E. A. Mearns 4203* (US); prostrate bunches around hot springs, Norris Basin, July 29–30, 1906, *A. S. Hitchcock 1902* (US).

A specimen collected at the borders of hot springs in August 1885, at Yellowstone National Park, (*Tweedy 580*) differs from

the type in the more slender and lax culms, the less stiff leaves and the obovate-elliptic and slightly longer spikelets.

A group of specimens differing from typical *P. ferventicola* could not be separated varietally. Their culms were erect and nine to twenty centimeters long. The loosely clasping, somewhat enlarged sheaths, which were usually overlapping, together with the thicker and usually longer and broader blades (especially those arising from upper nodes of the stem) gave a denser looking mat than is normally found in *P. ferventicola*. The specimens examined are: WYOMING. Yellowstone National Park: altitude 7500 feet, Lower Geyser Basin, August 4, 1897, *Rydberg & Bessey 3546* (G, F, RM); edge of hot pool, July 29, 1926, *H. S. Conrad 1961* (RM); altitude 7400 feet, Upper Basin, July 17, 1906, *W. S. Cooper 102y* (RM). UTAH. Salt Lake City: gardens, 4300 feet, September 4, 1932, *W. D. Stanton 826* (US). Although the blades are not as densely velvety the habit of the following specimens allies them with the group just cited. WYOMING. Yellowstone National Park: on geyser cone slopes, Sylvan Geysers, July 26, 1899, *A. and E. Nelson 6174* (RM) around hot springs on wet bank of Firehole River, Upper Geyser Basin, July 6, 1934, *G. N. Jones 5306* (UC).

Very definite characters separate *Panicum ferventicola* and its varieties from *P. thermale*. The dense, prostrate, light green and purple mat of *P. ferventicola* with its stiff and relatively short ascending or spreading leaves contrast strikingly with the more slender, taller, tufted, light green plant of *P. thermale* with its long, narrow, upright taper-pointed leaves. *Panicum ferventicola*, judging from specimens seen, occurs only about the hot springs throughout Yellowstone National Park.

PANICUM FERVENTICOLA var. **sericeum**, var. nov. Plantae pallide virides caespitosae, culmis gracilibus erectis 7–34 cm. longis saepius e nodis ramosis, villosis, pilis saepe basi papillosis; vaginae in plantis altioribus internodiis breviores, dense papilloso-villosae; laminae lanceolatae e basi cordata sensim angustatae, acutae vel acuminatae, tenues, erectae vel patentes, 4–6.4 cm. longae, 5–11 mm. latae, subtus inter venas breviter dense sericeae, pilis basi papillosis, supra glabrae vel pilosae, margine cartilagineo scabro; paniculae pallide virides vel ad spiculas purpureae, in plantis junioribus longiexsertae, saepius latiores quam longi, 3–5 cm. longae, 3–6.8 cm. latae, ramis patentibus papilloso-villosis; spiculae papilloso-pilosae oblongo-ellipticae usque obovoideo-ellipticae, subacutae, 1.5–2 mm. longae.

Plants light green; culms 7–34 cm. long, usually branching from nodes, villous, base of hairs, especially on lower internodes and upper part of peduncle, often papillose; ligule 3–5 mm. long; sheaths densely covered with papillose-villous hairs; blades thin, lanceolate, gradually tapering from a cordate base, erect to spreading, 4–6.4 cm. long, 5–11 mm. wide, veins prominent, lower surface satiny, hairs papillose at base, thickly covered with very short silky hairs between the veins, upper surface glabrous or hairy, if glabrous, the surface in some appears corrugated with flattened ridges, in hairy forms the papillae may be separated or united in long lines closely paralleling or covering the veins, all the hairs may be short, or long hairs may be scattered between them and increase in length and density toward the base of the leaf; panicle usually broader than long, 3–5 cm. long, 3–6.8 cm. wide, lower part of axis and branches papillose-villous; spikelets oblong-elliptic to obovate-elliptic, slightly pointed, 1.5–2 mm. long, 0.8–1 mm. wide; first glume truncate to acute, about one-fourth the length of the spikelet; second glume and lemma subequal, shorter than the fruit at maturity; fruit 1.3–1.7 mm. long, 0.8–0.9 mm. wide, slightly pointed.

The autumnal form is shorter than the vernal, more densely tufted at the base, with leaves not reduced, and with panicles included to short exserted.

Wyoming. Yellowstone National Park: in wet ground about hot springs, Mammoth Hot Springs, July 21, 1889, *A. & E. Nelson 6037* (RM 20108 type, G); Mammoth Hot Springs, October 15, 1902, *E. A. Mearns 4870.*

Panicum ferventicola var. *sericeum* may be at once distinguished from *P. ferventicola* by its loose mat of thin, light green leaves with a satiny luster on the lower surface; its panicles, which are broader than long; and its oblong-elliptic to obovate-elliptic spikelets which vary from 1.5 to 2 mm. in length. The absence of purple in the stems and leaves is another peculiarity of this variety.

Panicum ferventicola var. **papillosum**, var. nov. Plantae pallide virides atque plus minusve purpurascentes, caespitosae, pilis omnibus basi papillosis, culmis gracilibus erectis 10–25 cm. longis, glabris vel villosis; vaginae adpressae vel patentes, dense velutino-villosae; laminae crassae, adscendentes vel patentes, inferiores ovato-lanceolatae vel late lanceolatae, superiores longiores atque angustiores, 3–5.5 cm. longae, 9–12 mm. latae, utrinque basibus papillosis pilorum asperatae, subtus sparse breviter pilosae, supra apicem versus breviter pilosae, basin versus pilis sensim longioribus pilosae, margine cartilagineo scabro; paniculae vulgo longiexsertae atque latiores quam longae, 2.2–4.3 cm. longae, 2.2–4.9 cm. latae, ramis infimis patentibus densifloris villosis; spiculae purpureae papilloso-pilosae, ellipticae vel obovoideo-ellipticae, 1.7–2 mm. longae.

Plants light green with varying amounts of purple, all hairs papillose at base; culms 10–25 cm. long, branches arising from nodes along the culm, glabrous to villous; ligule 3–4 mm. long; sheaths densely velvety-villous; blades of culm thick, stiffly ascending or spreading, ovate or broadly lanceolate at base of stem, uppermost and those on branches longer and narrower, 3–5.5 cm. long, 9–12 mm. wide, both surfaces roughened by large papillae at base of hairs, lower surface with scattered hairs about 1 mm. long, upper surface usually with short, scattered hairs near tip and increasingly longer hairs near base; panicle broader than long, 2.2–4.3 cm. long, 2.2–4.9 cm. wide, sparsely villous below panicle, base of axis branches villous; spikelets purple, elliptic to obovate-elliptic, 1.7–2 mm. long, 0.8–1 mm. wide; first glume about one-third the length of the spikelet; fruit 1.5–1.7 mm. long, 0.7–0.9 mm. wide.

ALBERTA. Banff, on a declivity wet with water from hot spring, July 21, 1914, *A. S. Hitchcock,* American Grasses no. 220, US (G, type; F 427157 isotype); Banff, vicinity of basin, altitude 4600 feet, June 8, 1906, *Stewardson Brown 17* (G).

Panicum ferventicola var. *papillosum* is most readily distinguished from *P. ferventicola* by its papillose-roughened, broader leaves, its panicles which are broader than long, and its elliptic to obovate-elliptic spikelets 1.7 to 2 mm. long. Specimens of this variety are recorded only from the vicinity of Banff, Alberta.

Panicum lassenianum, sp. nov. Plantae pallide virides atque ubique purpurascentes, caespitosae; culmi adpressi vel patentes villosi 13–35.5 cm. longi; ligula 3 mm. longa; vaginae dense papilloso-villosae, pilis adpressis vel saepius patentibus; laminae crassae, erectae vel patentes, lanceolatae ad lineari-lanceolatae, supra basin angustatae, pungentes, in sicco superne involutae, subtus longe vel breviter velutino-pilosae, pilis brevibus atque longis saepe intermixtis, supra pilis longis et brevibus intermixtis vulgo sparse pilosae; paniculae inclusae usque longiexsertae, 5.5–6.5 cm. longae, 2.5–3.3 cm. latae, vulgo ca. duplo longiores quam latae, densiflorae, ramis erectis, infimis fasciculatis; spiculae purpureae obovoideo-ellipsoideae papilloso-pilosae 1.8–2 mm. longae, 0.8–1 mm. latae.

Plants light green and purple throughout, tufted, forming dense mats; lower nodes of longest culms geniculate and branching, nodes with dense ring of hairs and glabrous band below node; culms appressed to spreading, villous, 13–35.5 cm. long, internodes of culms often curved; ligule 3 mm. long; sheaths densely papillose-villous with appressed or usually spreading hairs; blades thick, stiffly upright to spreading, lanceolate to linear-lanceolate, narrowed above the base, pungent, becoming involute on upper part when dry, lower surface with short or long hair or both, velvety pubescent with hairs rather sparse to dense, upper surface with short hair and long hair intermixed both usually sparsely scattered, the long hair occurring on the lower half of the leaf, the tip of the leaf often glabrous, blades of main culm 4.5–7.5 cm. long, 6–9 mm. wide; panicles included to long-exserted, 5.5–6.5 cm. long, 2.5–3.3 cm. wide, usually about twice as long as wide, branches upright, lower branches of axis fasicled, densely flowered; spikelets purple, obovate-elliptic, papillose-pilose, 1.8–2 mm. long, 0.8–1 mm. wide, first glume truncate to acute tipped, about one-fourth to one-half the length of the spikelet, 0.3–0.6 mm. long; fruit 1.5 mm. long, 0.8 mm. wide.

California. Plumas County: Devil's Kitchen, Hot Spring Valley, 6200 feet, June 6, 1910, *W. L. Jepson 4082* (type, US 725572). *Panicum lassenianum* resembles *P. ferventicola* in its light green and purple densely prostrate mat and its ascending or slightly spreading, stiff, velvety leaves. As first noted by Dr. Steyermark, however, the pubescence of the lower leaf surface is often not as dense as in *P. ferventicola;* furthermore the two species are widely separated geographically. The panicle, narrower than long and with ascending, rather densely fascicled branches, places *P. lassenianum* with *P. thermale* and *P. pacificum* of the Pacific states. The predominance of densely velvety leaves, however, indicates that it has a closer relationship to *P. thermale* than to *P. pacificum.*

In the following key *P. lanuginosum* Ell., although an eastern species, has been included because, in common with the new entities, it resembles closely the Pacific states group.

Lower surface of leaves densely velvety-pubescent.
  Plants tufted, tall, always some shade of green, never purplish; autumnal leaves reduced.
    Culms 1.2–4.2 dm. long; panicles included; spikelets 1.7–2 mm. long, 0.5–1 mm. wide; autumnal blades not ciliate .... *P. thermale*
    Culms 4–7 dm. long; panicles exserted; spikelets 1.8–1.9 mm. long, 1 mm. wide; autumnal blades ciliate *P. lanuginosum*
  Plants forming dense prostrate mats with varying amounts of purple; autumnal leaves not reduced.
    Panicles included to exserted, not as broad as long, densely branched, the branches ascending, the lower branches usually fasicled; spikelets 1.8–2 mm. long .... *P. lassenianum*
    Panicles long-exserted, as broad as long, branches spreading; spikelets 1.4–1.8 mm. long .... *P. ferventicola*
Lower surface of leaves not densely velvety-pubescent.
  Leaves thin, lanceolate, satiny on lower surface, short silky hairs papillose at base and occurring in rows parallel with the veins; veins conspicuous; panicles 3–6.8 cm. wide .... *P. ferventicola* var. *sericeum*
  Leaves thick, stiff, ovate to broadly lanceolate, papillose-roughened on both surfaces, hairs scattered; panicles 2.2–4.9 cm. wide .... *P. ferventicola* var. *papillosum*

Field Museum of Natural History,
Chicago, Illinois, April 17, 1938.

A NEW THISTLE FROM OREGON

L. F. Henderson

The thistle here described as new has been known for a long time, but has been confused with other species. With its characters well worked out it seems to constitute a well marked entity. It has been named in honor of Professor Morton E. Peck of Willamette University.

Cirsium Peckii sp. nov.

Caulis robustus fistulosus 8–15 dm. altus supra lanatus capillis longis sectis; foliis prope glabris praeter rhachem lanceolato-oblongis profunde pinnatifidis vix decurrentibus apicibus spinis tenuibus flavis, inferioribus 1.5–2.5 dm. longis superioribus redactis spinis longioribus pluribus armatis; capitellis in fasciculis parvis vel solitariis axillaribus; involucro 3.5–4 cm. alto 5–6 cm. lato laxe interdum dense lanoso, squamis vix adpressis subaequalibus, exterioribus spinuloso-marginatis reliquis tenuissimis in spinas longas flavas a basi coarctantibus; corollis pallide lavendulaceis, faucibus valde dilalatis; antheris acutis.

Herbage yellowish green; stem stout and fistulose, simple below the middle, strongly striate-ridged, 8–15 dm. high, loosely woolly with long septate hairs or finally nearly glabrous toward the base; leaves lance-oblong in outline, scarcely decurrent, deeply pinnatifid, the segments 3-cleft and often low-toothed, the apices all with slender yellow spines, glabrous on both faces except the sparsely woolly midrib, the lower 1.5–2.5 dm. long, the upper reduced and with longer and more copious spines; heads clustered or solitary at the ends of the stem or branches or in the upper axils; involucre 3.5–4 cm. high, 5–6 cm. broad, loosely, often copiously arachnoid-woolly, the bracts not closely appressed, the outer grading into the peduncular bracts, spinulose-margined, the others very narrow and tapering almost from the base into long yellow spines; corollas pale lavender, the throat rather strongly dilated, equaling or longer than the tube, the lobes acute; anthers acute.

Type. Dry rocky sagebrush land, Alvord Ranch, east base of Steen Mountains, Harney County, Oregon, June 6, 1927, *Henderson 8521* (Herbarium of the University of Oregon, Eugene).

Specimens examined. Harney County: dry bank of stream near Alvord Ranch, east base of Steen Mountains, June 6, 1927, *Henderson 8524;* Wildhorse Valley (east slope of Steen Mountains), June 20 (year ?), *Cusick 2594;* damp ground, lower canyon of Wild Horse Creek, east slope of Steen Mountains, June 29, 1925, *Peck 14144;* stream bank near mouth of Willow Creek canyon, east base of Pueblo Mountains, June 27, 1936, *Peck 19069.* The sheets collected by Cusick and Henderson are in the

Herbarium of the University of Oregon, those collected by Peck are in the Herbarium of Willamette University.

This interesting plant is apparently most nearly related to *Cirsium scopulorum* (Greene) Cockerell and *C. Clokeyi* Blake, but differs from both in several well marked characters. It is a conspicuous species by reason of its very robust habit, yellowish green color, large heads and very copious yellow spines.

University of Oregon, Eugene,
December 3, 1938.

IRA C. OTIS
(1861–1938)

It is with sincere regret that we report the passing of Mr. Ira C. Otis, who ranked high as a discriminating, skillful and enthusiastic botanical collector, notably of the genus *Carex*. Mr. Otis was born in Wisconsin in 1861, and moved to the state of Washington in 1889, where he continued to reside, except for a few years spent in California, until his death in Seattle, November 2, 1938.

He attended the University of Minnesota, studying mathematics and surveying, and entered actively into the latter profession before attaining his degree. As a surveyor, he helped locate several important highways and railways in Washington.

His first hobby was the solving of mathematical "brain twisters," but several years ago, while living at Olympia, he began to take walks with a local amateur botanist. Soon he became so interested in plant science that his books on mathematics were permanently laid aside, and thenceforth his eager mind was ever alert for plants that were new or interesting to him. He bought all the manuals of northwest botany obtainable, including a copy of the rare "Flora of Northwest America" by Thomas Howell. His plant specimens are always well selected and so skillfully prepared that they often look like paintings.

Identification of material in a new country is always difficult and, in spite of the pioneer work of Howell, Gorman, Henderson, Flett, Suksdorf, and Piper, the task is still difficult in the Pacific Northwest. Mr. Otis, like any other enthusiastic amateur, groped about for help, and a glance at his botanical correspondence shows that he discovered—as have so many other amateurs—a real friend in Dr. William R. Maxon, Curator of the National Herbarium. Mr. Otis sent some ferns to Dr. Maxon to identify, including in the bundle specimens of *Carex* and a borage. The *Carex* specimens were promptly turned over to Mr. K. K. Mackenzie who was at that time earnestly at work on a treatment of that difficult genus for Abram's "Illustrated Flora of the Pacific States"; the borage was given to Professor C. V. Piper.

Mr. Mackenzie was greatly pleased with the *Carex* collection

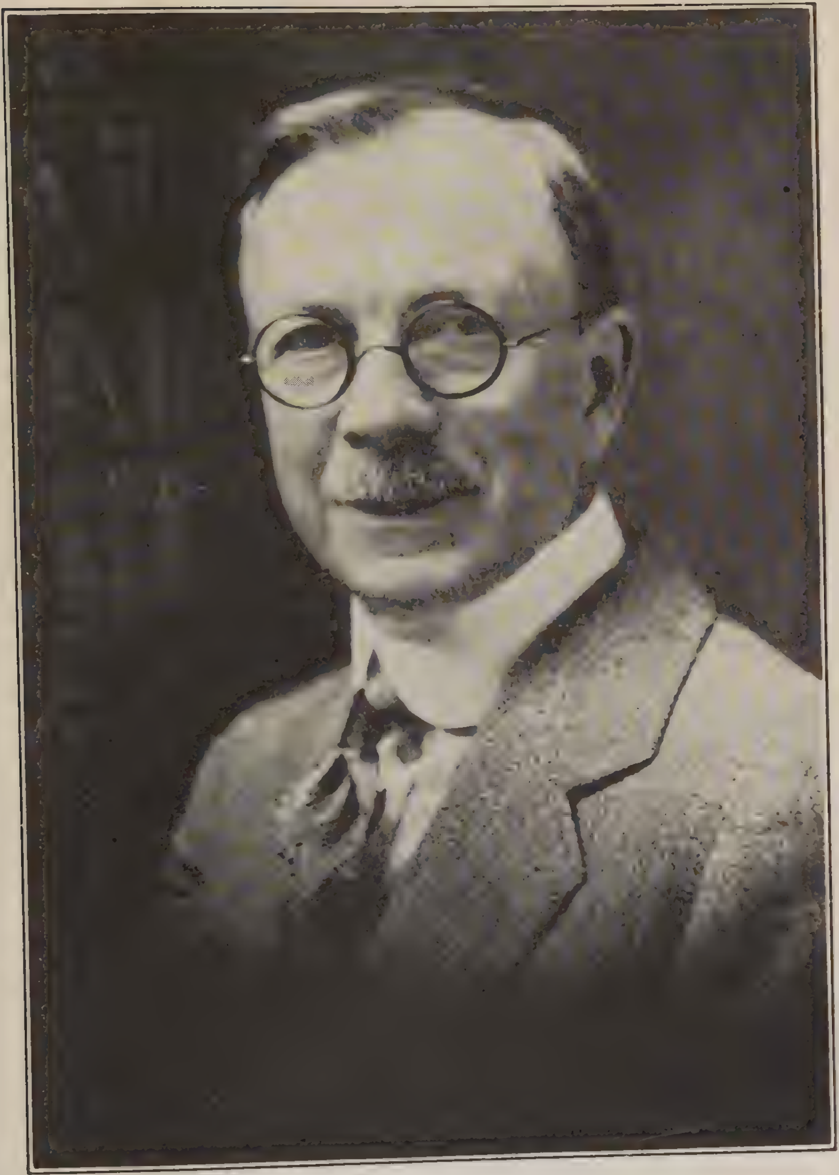

Plate 8. Ira C. Otis

and wrote a personal letter to Mr. Otis asking him to continue collecting for him. To this request Mr. Otis replied: "I would be glad to send you a liberal supply of specimens of *Carex* as a means of getting them named. I believe it no disgrace, especially for an amateur, to hesitate to name the specimens of *Carex*."

This arrangement pleased Mr. Mackenzie very much, and he replied with the following advice, which is too good not to repeat for future collectors of that tough genus:

> "*First:* do not collect immature or imperfect specimens unless there is some very special reason. Such material can usually be named, but it is always unsatisfactory to deal with.
>
> "*Second:* collect full specimens. Very valuable characters are found in the rootstocks and lower part of the culms.
>
> "*Third:* get a full series of all species seen in each locality visited. Do not be afraid of sending lots of specimens of the same species collected at different localities. The most valuable herbaria are those built up on this basis.
>
> "*Fourth:* get a geological map of your state if you can. If you have both acid and limestone regions you will derive great pleasure in studying the very great differences in the floras of the two regions. In the East this is very well marked in the *Carex* flora, but we have very little data on the point as far as the West is concerned. Also make a special study of any natural fresh water ponds and open spruce bogs."

From that time on Mr. Otis took especial pains to collect *Carex* at every opportunity, and a glance at the splendidly prepared specimens suggests that he first measured each one by the "*Carex* yardstick" given above.

Although Mr. Otis discovered no new species in the genus *Carex,* his specimens were of invaluable help in clarifying poorly known species, and in extending ranges. He was the first botanist to find *Carex physocarpa* Presl and *C. livida* (Wahl.) Willd. in Washington and the first to find *C. stygia* Fries in the United States. All these species were found on the Olympic Peninsula, two in the Olympic Mountains proper, a range which particularly fascinated Mr. Otis. He hoped to spend his last years collecting in the little known heart of this region, but fate decreed otherwise by his sudden and untimely death.

The borage specimen, as mentioned before, was turned over to Professor C. V. Piper who, after study of additional material collected by Mr. Otis, recognized it as new to science and described it as *Lappula venusta* (Proc. Biol. Soc. Wash. 37: 93. 1924). Dr. Harold St. John later transferred the species to a segregate genus, and it is known today as *Hackelia venusta* (Res. Stud. Wash. State College 1: 104. 1929).

Mr. Otis had found it growing in granitic drifts by the snow sheds in Tumwater Canyon near Leavenworth in the Wenatchee Mountains. It is truly a remarkable plant, more closely resembling a large caespitose phlox than the "weedy" borages of the region. Mr. Otis received many requests for material of the newly described species and eventually had none left for his own herbarium. Dr. St. John, then at the State College of Washington, received at his own urgent request the last of these sheets. In 1932 the writer visited the type locality and collected a large number of duplicates which were later widely distributed; one of these was turned over to Mr. Otis. This was the beginning of a friendship that lasted until his death. Now that his entire herbarium of three thousand sheets has gone to the State College, it is to be hoped that the sheet collected by Mr. Otis will be placed with the main Otis collection.

During the location of the Olympic Loop Highway, Mr. Otis was stationed at the town of Forks and botanized as much as possible in his spare time, visiting Lake Ozette and neighboring parts of the Olympic Mountains. On these trips he found several plants not previously known to occur within the state. Among these are *Erythronium revolutum* Smith and *Plantago macrocarpa* Cham. & Schlecht.

On the Hoh River trail in western Jefferson County he collected grass specimens which Dr. St. John believed to represent an undescribed species of the genus *Glyceria.* No description was published, however, since Dr. St. John shortly after left the State College to accept a position at the University of Hawaii. The writer began exchanging specimens with Mr. Otis at about this time and acquired two sheets of the plant. Dr. A. S. Hitchcock was then working on the "Manual of Grasses" and one sheet of this material was sent to him. He promptly replied that it was undescribed and, accepting the writer's suggestion, duly published it as *Glyceria Otisii* (Amer. Journ. Bot. 21: 128. 1934).

All who knew Mr. Otis will agree that his method of doing things—arranging a plant for the press, mounting a specimen, writing a label, composing a letter—can be summed up neatly in the word "meticulous" in its broad and liberal meaning. It was a pleasure to talk with him, and especially to see the sparkle in his eye when he found the answer to some perplexing problem of identification. He was truly a man one does not forget.—J. William Thompson, Cleveland High School, Seattle, Washington.

REVIEWS

The Leguminous Plants of Wisconsin. By Norman C. Fassett. Pp. viii + 157 with 24 plates and 97 text figures. Published by the University of Wisconsin Press. Madison. 1939. $3.00.

This work is a detailed, profusely illustrated distributional and taxonomic study of the species of the family Leguminosae that occur in the state of Wisconsin. The discussion of each species is accompanied by a map of its known distribution. Separate keys prepared by the author are based upon flowers, fruits and seeds, and a key prepared by Cathrine Mose is based upon epidermal outgrowths. Illustrations are by Richard I. Evans.

From the distribution pattern of the various species the author concludes that the Wisconsin species represent several floristic sources as to their origin. The largest element seems related to the southeastern woodland; the next largest group to the prairie floras. Most of these species find their northeastern or northwestern limit in Wisconsin. In addition there is a marine beach element occurring chiefly on the shores of the Great Lakes and elsewhere on the beaches of the Atlantic and Pacific oceans. One species is recorded as Arctic in origin and a few as very local in Wisconsin; only one strictly endemic species is recorded. Attempts at correlation with glacial history as well as with the edaphic problems of the state are made.

Such graphic presentations of the occurrence of species are sorely needed before intelligent conclusions can be drawn as to distributional problems. They present first the problems of presence and absence and point the way to investigation aimed to determine the adequacy of the data. The first question that comes to mind concerning a gap in distribution is whether or not the area has been adequately collected. There are already too many conclusions based upon inadequate collections. They present next, problems involving the causes of the distribution pattern. Comparisons of these maps with soil, climatic or geological maps can aid one in determining whether the controlling factor is climatic or edaphic, or whether it involves also complex geological and migrational history.

In glancing at the maps presented there is much that tempts speculation. On most of the maps a blank spot stands out that seems to one not familiar with the physical features of the region to call for explanation. This area which centers in Richland County and involves the adjacent portions of adjoining counties to the east, west and north, coincides with a portion of the driftless area. The location of rivers is well marked by collectors' localities. Again the question arises: is the river the agent of dispersal or only the highway of the collector? A general discussion of some of these problems in the light of the data presented would have been appreciated by the reader who is fully aware of the difficulties imposed upon the problem by a settled immaculate agriculture.

In general the author's ideas are clearly expressed and well presented. Details of description are clarified by good illustrations; the typography is excellent.—H. L. M.

Flora of Riverside and Vicinity. By Rosamond A. Fawcett. Occasional Papers of Riverside Junior College, Volume IX, Number 1. Pp. 172 with three pages of line drawing and a map of Riverside County, California. Published by the Junior College, Riverside, California, April 1, 1939.

"Western Riverside County, to the east edge of the Coachella Valley, and a contiguous portion of San Bernardino County to the north foot of the San Bernardino Mountains and keys for determining the names of native trees, shrubs, herbs, ferns, and most of the weed plants of cultivated fields. (The grasses are omitted.)" Thus reads the subtitle of the most recent addition to the local floras of the California area. The work is composed of keys to family, genus and species. Descriptions are not included. The first page treats of the principal groups of plants in which are differentiated the Thallophyta and Embryophyta, the Atracheata and Tracheata, the Lycopsida and Pteropsida, the Gymnospermae and Angiospermae, and the Dicotyledoneae and Monocotyledoneae. This series of main subdivisions has not previously been used in any California flora. Only the Lycopsida and Pteropsida are treated further. The arrangement is essentially Englerian. The work should prove a useful addition within its intended scope in the local area to which it applies.—H. L. M.

NOTES AND NEWS

ELODEA DENSA CASP. IN CALIFORNIA. Recent collecting in the marshes of the delta of the San Joaquin River disclosed large colonies of *Elodea densa* Casp. flowering abundantly in Trapper's Slough on Roberts Island about eight miles west of Stockton (*H. L. Mason 12,075,* August 26, 1938). This is a common South American species apparently recently escaped from cultivation. It has been reported also from Florida. It differs from *E. canadensis* Michx. in its larger size, its leaves in whorls of four instead of two or three, and its flowers two or three to a spathe instead of solitary.—H. L. M.

RIBES TULARENSE (COV.) FEDDE IN SEQUOIA NATIONAL PARK. *Ribes tularense* (Cov.) Fedde, described thirty years ago from a single specimen and not since recognized in the field, has recently been discovered in Sequoia National Park by T. H. Harris and F. A. Patty, members of the blister rust control project of the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture. Originally collected in Giant Forest, Tulare County, California, by Katherine Brandegee in 1905, the species was described by Frederick V. Coville as *Grossularia tularensis.* It is considered a distinct entity by Alwin Berger in his monograph of the genus (N. Y. State Agr. Expt. Sta., Tech. Bull. 109: 87. 1924). Jepson treats it as conspecific with *Ribes binominatum* Heller (Fl. Calif. 2: 159. 1936).

Plants of *Ribes tularense* were found in abundance, in May, 1938, along the Colony Mill road on north-facing and east-facing slopes at an altitude of about five thousand feet in a dense forest consisting mainly of white fir (*Abies concolor* Lindl. & Gord.) and sugar pine (*Pinus Lambertiana* Dougl.) The Colony Mill road is the "old" (North Fork of the Kaweah River) road into Giant Forest from Three Rivers, Tulare County. In the fall of 1938, after extensive reconnaissance by blister rust scouts in various portions of Sequoia National Park, *R. tularense* was found at Hidden Spring, northwest from Rejoicing Summit, across Yucca Creek canyon and up Cave Creek canyon. Specimens were collected and deposited in the Herbarium of the University of California, and living plants will be added to the collection of *Ribes* in the University of California Botanical Garden, Berkeley.

The relative susceptibility of this gooseberry to white pine blister rust has not been determined. Many of the plants in Sequoia National Park are located at such distances from five-leafed pines that they can probably remain undisturbed without endangering the pines.—Clarence R. Quick, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

On May 19, 1939, the Linnean Society of London elected five foreign members, three of these from the United States: Dr. W. K. Gregory of the American Museum of Natural History, New York City; Dr. Alfred Rehder of Harvard University; Dr. William Albert Setchell of the University of California. Dr. Setchell had been a Fellow of the Society for some time. The number of foreign members is limited to fifty. The Linnean Gold Medal was bestowed upon Dr. Elmer D. Merrill of Harvard University.

Word has been received that the National Museum of Natural History in Paris has awarded Dr. H. S. Reed, Professor of Plant Physiology, University of California, Berkeley, a diploma conferring upon him the title of 'Correspondant du Museum.'

Until the appearance of "Grasses of Oklahoma" by H. I. Featherly (Oklahoma Agricultural and Mechanical College, Technical Bulletin No. 3, 1–132. 1938) there had been no authoritative handbook covering the grasses of that region. Descriptions of 73 genera, 232 species (one of them new) and 24 varieties are included. Illustrations are given for 134 of the described species; tribal and generic keys are based on A. S. Hitchcock's work, but specific keys are, for the most part, original; a glossary and bibliography complete the work. Inclusion of cultivated grasses should make this handbook of special value to agriculturists of the region.

Three new signatures of "Species Lupinorum" by Charles Piper Smith have appeared recently. The contents are as follows: paper three, A Preliminary Survey of the lupines of Northern Mexico, exclusive of Sonora and Baja California (third signature, pp. 33–48, July, 1938; fourth signature, pp. 49–54, July, 1938); paper four, A Preliminary Survey of the lupines of Southern Mexico (fourth signature, pp. 54–64, July, 1938; fifth signature, pp. 65–80, August, 1938). Thirteen new species, and thirteen new varieties are described; six new combinations are made.